Research Department
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FRBSF Weekly Letter

# Inventories and the Recovery

The recent increases in output and July's one-half percent drop in unemployment suggest that the recovery has begun in earnest, despite persistently high interest rates. The question now is how strong will the recovery be? One important determinant of the strength and duration of the recovery is the vigor with which businesses seek to rebuild depleted inventories. A recent spot survey of businesses in the West suggests that firms are acting cautiously in rebuilding inventories because they want to prevent their stocks from growing at a faster pace than the sales they expect over the short term. This *Letter* examines the response of Western firms to the beginnings of the current upturn and the factors which will help determine inventory investment as the recovery progresses.

**Inventories and the business cycle**

The high cost of adjusting production and orders to every change in sales causes firms to let inventories rise and fall inversely with changes in demand. Inventory stocks tend to rise above desired levels when demand softens unexpectedly and to fall below desired levels when sales pick up. Inventories, therefore, act as an important buffer stock, allowing firms to respond to unanticipated changes in the demand for their products.

However, when inventory stocks remain above (or below) desired levels (relative to sales) for any extended period, firms respond by cutting (stepping up) the pace of production activity to bring inventories back in line with current and expected sales. As a result, changes in the level of inventories contribute significantly to the peaks and troughs of business cycles. For example, the $32.9 billion (in 1972 dollars) decline in net nonfarm inventory investment was a significant factor behind the recession which began in the third quarter of 1981. Almost three-fourths of the $45.1 billion drop in output during the recession was accounted for by this negative inventory investment. And although the recession officially ended in the fourth quarter of 1982, nonfarm businesses continued to run down their inventories at a $15.4 billion annual rate in the first quarter of this year, causing sluggish growth in output despite a strong upturn in sales.

However, firms now appear to be rebuilding inventories, or at least not to be depleting them further. Recent increases in sales, therefore, should show up as further increases in production, giving a boost to the nascent recovery. The $33.3 billion increase in real GNP (a 9.2-percent annual rate of growth) recorded in the second quarter, for example, is due, in large part, to the dramatically slower pace of inventory liquidation during that quarter.

Whether firms will continue to step up production and add to their stocks of inventory depends on their "bullishness" on the economy. Expected demand is clearly a key factor, but it must be weighed against current and expected levels of interest rates and firms' expectations regarding their own product prices which affect the cost of carrying inventory.

**Expected sales**

The current level of sales and expected future demand appear to be the most relevant considerations in determining short-term movements in inventory investment. To avoid any loss of business from short supplies, firms try to hold sufficient inventory to cover most increases in sales that might materialize. But firms must also pay the carrying cost of holding inventories. In general, they seek to minimize the cost of holding inventories by gearing inventory investment to current levels of sales while taking account of seasonal patterns in demand as well as any other factors that may cause future sales to diverge from current sales. Other things being equal (e.g., no

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changes in the cost of carrying inventory), firms typically try to keep the ratio of inventories to sales fairly stable, allowing the *level* of inventory stocks to vary as current and expected sales vary. Of course, if sales taper off from a weakening of the economy, firms will liquidate inventories to bring the inventory-to-sales ratio back down to the desired range.

The experience of western firms during the last recession and current recovery is a case in point. The process of inventory liquidation which began in earnest in response to lagging sales in the first quarter of 1982 has virtually come to an end in the nine western states that constitute the Twelfth Federal Reserve District. Inventories are currently at their lowest levels in almost ten years, and these low levels are considered desirable despite evidence of a strengthening western economy. Even firms that are experiencing strong demand for their products—most notably, electronics firms and retailers—are waiting for evidence that strong sales will be sustained. In general, most firms are rebuilding inventories very cautiously, relying not on annual sales forecasts but on actual orders or forecasts of sales no more than a few months ahead.

As sales pick up, of course, these firms expect to increase the *level* of their inventories. However, most intend to keep inventories "lean" in comparison to sales primarily because of uncertainty about future demand and the high cost of carrying inventory.

**Interest rates**

In today's environment, one of the factors that contributes to the high cost of carrying inventory is the persistently high level of interest rates. Like other forms of business investment, theory indicates that, other things unchanged, high interest rates will have a negative effect on inventory investment. Firms presumably cut back on inventory stocks during periods of high rates to reduce expensive borrowing or to conserve working capital for investment in alternatives, such as high-yielding, short-term financial instruments. A survey of western firms tends to confirm this relationship as most firms cited the high level of interest rates as a reason for their cautious approach to rebuilding inventories.

More sophisticated empirical tests of the relationship between inventory investment and interest rates, however, have yielded somewhat mixed results. Until recently, in fact, most studies did not find convincing evidence of any short-term connection between the level of interest rates and inventory investment. More recent studies examining inventory investment during the current period of high and volatile interest rates have tended to provide empirical support for this relationship, however. The disparity between the results of the older econometric studies, on the one hand, and the recent survey and the newer studies, on the other, raises questions about the way in which interest rates are assumed to affect inventory investment. It may be the case, for example, that inventory stocks respond less to random blips in interest rates than to changes that seem part of a cyclical pattern. Since the cost of changing the average level of inventories is significant, business will *wait* to see whether an increase in the level of interest rates is likely to be long-lived.

In addition to the impact of cyclical changes in interest rates on inventory investment, secular trends in the level of interest rates have an impact on the level of inventory investment as well. The upward trend in the level of interest rates during the 1970s, for example, induced many firms to try to exercise greater control over inventories in the course of the business cycle. Of course, firms will not perceive the advantages of investing in new techniques or technology that permit closer control of inventories until they believe the level of interest rates is likely to remain high enough to justify such investment. But once inventory control has been improved, a cyclical decline in the level of interest rates will not have the same effect on inventories that it would have had formerly. The average level of inventories in relation to sales is likely to be permanently lower despite a return to lower levels of interest rates.

Firms in the West have reduced their average inventory-to-sales ratios over the last ten years largely through substantial investments in inventory control. Large retailers as well as manufacturers and electronics firms in the West reported that computerized inventory control is the current norm for their industries, and that high interest rates were inducing them to continue enhancing their systems, generally by acquiring more timely information on inventories and sales.

**Expected inflation**
Expected increases in the prices of a firm's products should also affect the cost of carrying inventory and, thus, desired levels of inventory. The more a business expects its prices or the costs of its materials to increase in the near future, the less incentive it has to keep inventories low in the present.

Such a relationship is hard to measure empirically since one can only observe actual inflation for the economy as a whole (ex post) and not expected inflation for each good. However, evidence from the survey of firms in the West suggests that, for certain types of firms, expected price increases are an important criterion in determining the level of inventories. In the semi-conductor industry, for example, prices can change 20 to 30 percent in a fairly short period. An over-supply of goods in this market can ruin a firm when prices soften. By the same token, a firm that correctly anticipates a rise in prices will have an advantage over other firms by having increased its inventory stocks beforehand.

Likewise, retailers indicate that their desired levels of inventory tend to respond to expectations of future price increases. Given the widespread expectation that inflation in the near future will not run close to the double-digit levels of the past few years, western retailers plan to keep inventories lower than they would have several years ago.

**Less inventory investment**
The pace of inventory investment in the West in the next few years is likely to be more anemic than in past recoveries. Firms are attempting to keep inventories lean relative to sales even though the current rebound in sales for many industries is strong. They are concerned about the still high levels of unemployment and are wary of a sudden softening in demand that could make inventories excessive once again. Moreover, the high cost of carrying inventory, due to persistently high interest rates and lower expected inflation, acts as a substantial incentive to keep a tight control on inventories. Western firms, in fact, have made substantial investments in inventory control over the past ten years.

This is not to say that inventory rebuilding and stepped-up production activity are not occurring in many sectors. In particular, manufacturers of certain consumer goods as well as major retailers and electronics firms are currently enjoying a significant upturn in sales that is inducing them to rebuild inventories. Energy-related firms likewise expect to begin rebuilding inventories soon as the price of oil begins to firm and the winter-heating season draws near. Manufacturers of pulp and paper products are also beginning to rebuild inventories in response to a strong upturn in sales.

Inventories of heavy equipment manufacturers, in contrast, are still somewhat higher than desired because this industry has not experienced the upturn in sales that other industries have. Lumber inventories are also currently higher than desired, given the recent softening in demand due to the decline in the housing industry. Nonetheless, as firms gain faith in the strength of the recovery, the prospects for inventory investment and increased production in the West are likely to improve.

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## BANKING DATA—TWELFTH FEDERAL RESERVE DISTRICT

(Dollar amounts in millions)

| **Selected Assets and Liabilities Large Commercial Banks** | Amount Outstanding 8/31/83 | Change from 8/24/83 | Change from year ago Dollar | Change from year ago Percent |
|---|---|---|---|---|
| Loans (gross, adjusted) and investments* | 161,032 | 286 | − 1,021 | − 0.6 |
| Loans (gross, adjusted) — total# | 140,697 | 341 | − 895 | − 0.6 |
| Commercial and industrial | 43,123 | 104 | − 1,817 | − 4.0 |
| Real estate | 56,703 | 61 | − 825 | − 1.4 |
| Loans to individuals | 24,429 | 214 | 947 | 4.0 |
| Securities loans | 2,180 | − 331 | − 245 | − 10.1 |
| U.S. Treasury securities* | 7,532 | 72 | 1,186 | 18.7 |
| Other securities* | 12,802 | − 127 | − 1,312 | − 9.3 |
| Demand deposits — total# | 42,269 | 3,286 | 415 | 1.0 |
| Demand deposits — adjusted | 29,665 | 1,391 | 1,175 | 4.1 |
| Savings deposits — total† | 65,677 | 30 | 34,341 | 109.6 |
| Time deposits — total# | 67,095 | − 6 | − 32,378 | − 32.5 |
| Individuals, part. & corp. | 61,336 | 104 | − 28,525 | − 31.7 |
| (Large negotiable CD's) | 17,694 | − 249 | − 19,569 | − 52.5 |

| **Weekly Averages of Daily Figures** | Week ended 8/31/83 | Week ended 8/24/83 | Comparable year-ago period |
|---|---|---|---|
| **Member Bank Reserve Position** | | | |
| Excess Reserves (+)/Deficiency (−) | 148 | 88 | 78 |
| Borrowings | 136 | 11 | 7 |
| Net free reserves (+)/Net borrowed(−) | 13 | 77 | 71 |

* Excludes trading account securities.
\# Includes items not shown separately.
† Includes Money Market Deposit Accounts, Super-NOW accounts, and NOW accounts.

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